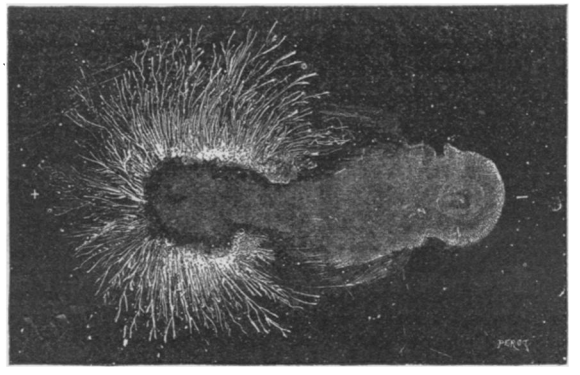

FIG. 6.

"With the spark," says M. Planté, "the distribution of negative electricity presents a curious crab-shaped appearance (Fig. 6.) With the aigrette, the electric movement around this same negative pole gives us the no less bizarre form of a polypus whose tentacles extend towards the positive pole, but do not reach it." (Fig. 5.)

From these results and other experiments quoted by M. Planté, he concludes that a blending of the two electricities may exist at each pole. This would infer that with electric currents of sufficient tension to obtain a continued series of discharges of static electricity, we could have a complete decomposition of the water at each pole and consequently a mixture of hydrogen and oxygen.

Pushing the study of these sparks still further, we find that the movement proceeding from the positive pole, externally, envelopes the negative electric movement like a bundle of curved sky-rockets. However, we often see at the same time an inward flux of positive electricity around the line of the spark between the positive current enveloping the exterior, and between both, the negative electric current which appears as though inhaled by the positive pole. This led M. Planté to suppose that the negative electricity, or else the ponderable matter which it carries with it, moves in an annular space furnished by the electrified matter proceeding from the positive pole. According to him, it would follow that the aspiratory or ascendant effects of the water obtained by electric currents of high tension might explain the ascension of water in a cloudy form as seen in water-spouts.

In a forthcoming article we will study other phenomena no less remarkable, which have been revealed by M. Planté's rheostatic machine. Among these are colored sparks and vibrations determined in a platinum wire traversed by a current of interrupted quantity, a phenomenon which can account for the effects produced in telephones by a simple wire crossed by a current.

TH. DU MARCEL.

To be continued.

ON A PROCESS FOR UTILIZING WASTE PRODUCTS AND ECONOMIZING FUEL IN THE EXTRACTION OF COPPER.*

BY J. DIXON (ADELAIDE, SOUTH AUSTRALIA.)

This paper contains an account of a process for extracting copper from sulphurous ores, in which the heat generated by the combination of the oxygen of the air with the sulphur of the ore is utilized for the smelting of the ore. This process is based upon experiments, which, although the author regards as incomplete, show (1) that the charge grows visibly hotter by simply blowing air through it; (2) that the melting of the raw ore or regulus and its reduction can be carried on in the same furnace; (3) that if the ore is in lumps, and fed at the top whilst the air is admitted by the side, a practically clean slagg can be obtained; but if added in a coarse powder, as it is generally found in the market, it either blows out again or chokes the furnace; (4) that a rough copper of about 96 per cent pure metal can be obtained by the successful working of this process.

*British Association, 1881.

ON THE CHEMICAL ACTION BETWEEN SOLIDS.*

BY PROF. THORPE, PH. D., F.R.S.

The author drew attention to the extremely rare instances of such action hitherto observed, showing how many of these might be explained on the supposition that combination actually occurred between the bodies either in solution or in a state of gas. For example, the formation of cement steel, by the combination of carbon with iron, which had long been adduced as an example of such combination between solids, was now explained by the fact that iron at a high temperature was permeable to gases, and that in the actual process of cementation oxides of carbon were formed, which were in reality conveyors of carbon to the metal. He then illustrated by experiments the formation of several compounds by bringing together the components in solid form, choosing as examples such as would manifest their formation by characteristic coloring. Thus, as instances, potassium iodide and mercuric chloride, potassium iodide and lead nitrate, and silver nitrate and potassium chromate, were powdered together in a mortar, and in each case evidence of an action was exhibited by the production of characteristic colors of the product of the reaction of these compounds. The author referred to the memoir of the Belgian phycisist, Prof. Spring, on the same subject, some of whose experiments he had repeated and in the main confirmed. One of the most remarkable results obtained by the Belgian professor was the formation of coal from peat by subjecting the latter material to a high pressure. Peat from Holland and Belgium, when exposed to a pressure of about 6,000 atmospheres, was, according to Spring, changed into a mass which in all physical characters resembled ordinary coal. Experiments of the same nature made by Dr. Thorpe with various samples of British peat yielded, however, a very dissimilar result. These experiments were made with pressures which were considerably less and more than those employed by Spring. Although solid, compact masses, hard and very much changed in structure, were attained, in no case was any product obtained which could be confounded with bituminous coal. He said it was highly improbable, on purely chemical grounds, that mere pressure had been little more than an important factor in the transformation of woody matter into coal.

A NEW DEMONSTRATION OF THE CARBONIC ACID OF THE BREATH.

BY C. F. CROSS.

Some time since I made the observation that the carbonic acid of the breath determines the liberation of iodine from a mixture of potassium iodide and iodate, and that the presence of starch renders the decomposition a very effective lecture-experiment, in demonstration of the presence of an active acid body in respired air. A friend to whom I lately communicated this result, threw doubt upon my interpretation, and while admitting the occurrence of the decomposition under the condition of respiring vigorously into the solution, preferred to attribute it to the action of the air or of acid vapors accidentally present. I therefore repeated the experiments

*British Association, 1881.